

REMARKS

This paper is filed in response to the Office Action mailed on March 8, 2006. Currently, Claims 1-12 are pending in the application. Claims 1-12 have been examined and stand rejected. Claims 13-21 are new.

The Rejection of Claims 1-12 Under 35 U.S.C. § 103(a)

Claims 1-12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kamayachi et al. (U.S. Patent No. 4,943,516) in view of applicants' admitted prior art (AAPA), and further in view of Nakatani et al. (US 2002/0026980 A1). Applicants respectfully traverse the rejection.

For a *prima facie* rejection, there must be a motivation or suggestion either in the references or in the knowledge generally available to combine references or to modify a reference, a reasonable expectation of success, and all the claim limitations must be taught or suggested by the prior art references.

The Combination of References Does Not Teach All Claim Limitations

Claims 1, 4, and 7 include the recitation "irradiating a laser beam to the laminated thermosetting film according to a solder resist mask pattern to selectively remove the thermosetting film." For a *prima facie* rejection, the prior art references must teach or suggest every claim limitation. Applicants respectfully submit that none of the cited and applied references teaches or suggests the above. In applicants' claims, the laser beam is irradiated on the laminated thermosetting film to selectively remove the thermosetting film. Therefore, applicants' claimed method is a simplified process over conventional solder resist mask pattern-forming methods.

In direct contrast with Claims 1, 4, and 7, the Kamayachi et al. patent describes exposing a laser beam onto a photosensitive thermosetting resin composition, which is followed by applying a developing solution and then post-curing. (Col. 16, lines 15-17.) The Kamayachi

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et al. patent describes that after exposing the coating to a laser beam, "[t]he unexposed portion of the coating is developed with the developing solution to give rise to a resist pattern." Thus, it is clear from the teaching of Kamayachi et al. that the laser beam is merely for exposing the photosensitive coating, not for removing it according to a solder resist mask pattern. Therefore, the Kamayachi et al. patent, either alone or in combination, does not teach or suggest, at least, "irradiating a laser beam to the laminated thermosetting film according to a solder resist mask pattern to selectively remove the thermosetting film."

There is No Suggestion or Motivation

The Examiner states, "Kamayachi et al. remain silent about the pre-treating the printed circuit board before lamination step."

The Examiner also states, "Applicant's admitted prior art (AAPA, herein after [sic]) teach pre-treating such as scrubbing process is carried out on both sides of the substrate to improve the adhesion between the photo solder resist (PSR) and the substrate (see specification page 6, lines 8-10)."

Based on the foregoing, the Examiner concludes, "it would have been obvious to one of ordinary skill in the art at the time of claimed invention to combine AAPA's teaching into Kamayachi et al.'s process for increasing bonding capability between the circuit board substrate and polymeric solder resist material as taught by AAPA."

Applicants disagree that there is any suggestion or motivation to combine the Kamayachi et al. patent with any purported statement of the prior art made by applicants. There has to be a credible motivation or suggestion. As understood by applicants, the suggestion or motivation is that combining AAPA's teaching into the Kamayachi et al. patent's process increases the bonding capability between the circuit board substrate and the polymeric solder resist material.

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A *prima facie* rejection requires an actual motivation or suggestion to modify or combine references. The Examiner's proposed modification of the Kamayachi et al. patent is inappropriate as it is merely redundant and unnecessary, since the Kamayachi et al. patent already teaches that the photosensitive thermosetting resin composition of the Kamayachi et al. patent is "capable of producing a cured coating excelling in adhesion. . . ." (Col. 3, lines 33-34.)

Applicants submit that the Kamayachi et al. patent does not teach or suggest pre-treating the circuit board substrate, because pre-treating to improve adhesion is unnecessary with the use of the inventive photosensitive thermosetting resin composition taught by Kamayachi et al. Since Kamayachi et al. already produces a thermosetting resin composition that excels in adhesion, there is no reason to modify the process to introduce more complexity by pre-treating. Therefore, the proposed modification of the Kamayachi et al. patent is, at best, wasteful. The motivation is not appropriate because adding a step for pre-treating a circuit board to achieve an advantage that the Kamayachi et al. invention already possesses is wasteful and unnecessarily adds complexity to the process. The motivation must be convincing and must outweigh evidence offered against it.

The initial burden is on the examiner to provide some suggestion of the desirability of doing what the inventor has done. "To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985).

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The ultimate determination of patentability is based on the entire record, by a preponderance of evidence, with due consideration to the persuasiveness of any arguments and any secondary evidence. *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). The legal standard of "a preponderance of evidence" requires the evidence to be

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more convincing than the evidence which is offered in opposition to it. With regard to rejections under 35 U.S.C. 103, the examiner must provide evidence which as a whole shows that the legal determination sought to be proved (i.e., the reference teachings establish a *prima facie* case of obviousness) is more probable than not.

M.P.E.P. § 2142, pp. 2100-134, Rev. 3, August 2005. Therefore, applicants submit that it is inappropriate to conclude modification of a prior art invention is obvious if the reason for the modification is to achieve an advantage that the prior invention already possesses. The Examiner's *prima facie* rejection is further weakened because performing the modification introduces added complexity, cost, and time to merely achieve something that the prior invention already possesses.

The Rejection of Claims 1-12 Under 35 U.S.C. § 103(a)

Claims 1-12 are rejected under 35 U.S.C. § 103(a) over Urasaki et al. (U.S. Patent No. 5,879,568), in view of applicants' admitted prior art (AAPA), and further in view of Nakatani et al. (US 2002/0026980 A1).

A *prima facie* rejection requires a suggestion or motivation either in the references or in the knowledge generally available to modify a reference or to combine references, a reasonable expectation of success, and all the claim limitations must be taught or suggestion by the prior art references.

The Combination Does Not Teach All Claim Limitations

Claims 1, 4, and 7 recite the limitation "irradiating a laser beam to the laminated thermosetting film according to a solder resist mask pattern to selectively remove the thermosetting film." Therefore, Claims 1, 4, and 7 recite that the purpose for irradiating a laser beam is to selectively remove the thermosetting film according to a solder resist mask pattern. Applicants submit the Urasaki patent does not teach or suggest the above. The Examiner cites

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the teachings in the Urasaki et al. patent at Col. 7, lines 50-58, and Col. 9, line 49-Col. 10, line 57.

At Col. 7, lines 50-58, the Urasaki et al. patent teaches the following:

A step of applying laser beams to the thermosetting resin layer exposed from the fine holes of the copper foil etched away into the shape of holes for forming IVH (Interstitial via holes) to remove said resin layer until the circuit conductors on the interlayer circuit board are exposed out, thereby forming the via holes.

The types of laser usable in this step include carbon dioxide laser, YAG laser, excimer laser, etc., of which carbon dioxide laser is preferred in view of productivity. (Parenthetical added.)

The Examiner has not made a *prima facie* rejection because the Examiner has not explained how the laser beam selectively removes the thermosetting film according to a solder resist mask pattern. At most, the Urasaki et al. patent teaches that a laser beam is applied to the thermosetting resin layer to form via holes, not for the purpose of selectively removing the film to form the solder resist mask pattern.

Col. 9, line 49 to Col. 10, line 57, supports applicants' position. The Urasaki et al. patent teaches,

The cured thermosetting resin layer 2 exposed from the openings 4 of the copper foil was irradiated with carbon dioxide laser beams under the conditions of energy density of 20 J/cm², oscillation time of 1 μ sec, oscillation frequency of 150 Hz and repetition pulse rate of 4 pulses to remove the resin layer until the circuit conductors in the interlayer board were exposed, thereby forming the via holes 5 as shown in FIG. 1D.

(Col. 9, lines 49-56.)

By applying laser beams, the resin layers were removed to the extent that the circuit conductors on the interlayer board would be exposed to form via holes 10, and then the holes designed to serve as through-holes 11 were formed as shown in FIG. 1H, followed by roughening in the same way as in the step (e).

(Col. 10, lines 21-26.)

As can further be appreciated by referring to Figures 1D and 1H mentioned in the above passages, the layer which is being irradiated by laser beams (layer 2) is not a solder resist mask pattern, but simply an insulating layer between a composite metal foil layer 3 and the interlayer board 1. (Col. 8, lines 51-67.)

Furthermore, the Urasaki et al. patent cannot teach or suggest irradiating a laser beam according to a solder resist mask pattern because the teaching regarding laser beam use comes after the solder resist mask has been removed.

Furthermore, the Urasaki et al. patent cannot teach or suggest irradiating a laser beam in the form of a solder resist mask pattern because Urasaki et al. teaches that a solder resist mask pattern is etched and removed prior to the laser beam exposure. At Col. 9, lines 39-49, Urasaki et al. teaches the formation and removal of an etching resist with an NaOH solution, prior to laser beam exposure.

Accordingly, the Urasaki et al. patent does not teach or suggest irradiating a laser beam for the purpose of selectively removing the thermosetting film to form a solder resist mask pattern.

The Examiner states that "the resin layer is then selectively irradiating [*sic*] with a laser beam in order to form prescribed solder resist pattern."

However, as is clearly evident from the foregoing discussion of the description and figures, Urasaki et al. contradicts this assertion.

Accordingly, the withdrawal of rejection is respectfully requested.

New Claims 13-21

Claims 13-21 are new and submitted to be allowable over the references of record.

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CONCLUSION

In view of the foregoing remarks, applicants respectfully submit that Claims 1-21 are in condition for allowance. If the Examiner has any further questions or comments, the Examiner may contact the applicants' attorney at the number provided below.

Respectfully submitted,

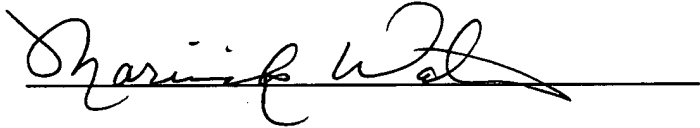
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Date: June 8, 2006



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